

Appl. No. 10/528,734  
Response dated: September 30, 2010  
Reply to OA of: March 30, 2010

### **REMARKS**

Applicants have amended the claims to more particularly define the invention taking into consideration the outstanding Official Action and in an effort to expedite the prosecution of this application to an early allowance. In this regard, the Examiner is invited to telephone the undersigned attorney to discuss what, if any, further amendments may be necessary to place the application in condition for allowance or at least to arrive at an indication of allowable subject matter. Moreover, the undersigned is available to conduct a personal or telephone interview with the Examiner at the Examiner's convenience.

Applicants have cancelled all of the claims in the application and added a new set of claims related to fermenting the chopped potatoes with a lactic acid producing bacterium which was included in cancelled claim 13. That aspect of the claimed subject matter relating to treating the chopped potatoes with a physiologically acceptable acid as set forth in claim 14 has been cancelled from the application without prejudice or disclaimer reserving the right to further pursue this aspect of the invention in a continuation application and in an effort to expedite the prosecution the present application to an early allowance. The cancelation of this subject matter obviates the rejections of claims 14 and those claims dependent thereon. Accordingly, it is most respectfully requested that these rejections be withdrawn.

In relation to claim 13, it is clear from the comments in the Official Action, that there is an issue with their interpretation and the extent to which some of the current features should be given patentable weight and thus considered limiting on its scope. Applicants have attempted to address these issues by way of the amendments to the claims. New claims 21-35 have been added to the application and are fully supported by the specification as originally filed. These claims include claims to further specific aspects of the invention as fully supported by the specification as filed. In these claims, claim 21 is based on rejected claim 13.

Appl. No. 10/528,734  
Response dated: September 30, 2010  
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However, this has been amended to specifically recite that the method involves chopping of the potatoes to produce "chopped potatoes in the form of batons having a cross-sectional area of 10 to 100 mm<sup>2</sup>" for which there is support on page 4, lines 4-6 of the specification. In order to improve clarity, the previous reference to "optionally loading the resulting part-cooked French fried potatoes into a container" has been deleted from the claim. The claim has also been revised to clarify that the step of frying the fermented chopped potatoes results in the production of "part-cooked" French fried potatoes. Applicants most respectfully submit that all of the claims now present in the application are in full compliance with 35 U.S.C. 112 and are clearly patentable over the references of record.

The rejection of claim 13 under 35 U.S.C. 103 as being anticipated by Kaaber as evidenced by Grivas et al and Afssa and as further evidenced by the definition of "chopping" has been carefully considered but is most respectfully traversed in view of the amendments to the claims and the following comments.

The rejection of claims 13 and 14 under 35 U.S.C. 102(b) as anticipated by Kaaber as evidenced by "Health Canada", Grivas *et al.*, Afssa *et al.* and by the definition of "chopping" has been carefully considered but is most respectfully traversed in view of the amendments to the claims and the following comments.

The concerns in the Official Action relating to the use of the term "chopping" in the claim and whether or not this reads onto the potato "slices" which are disclosed by Kaaber is addressed by the proposed claim amendments. The requirement that the chopped potatoes should be in the form of batons having a cross-sectional area of 10 to 100 mm<sup>2</sup> clearly distinguishes the French fries which are the subject of the invention over the "chips" which are produced in Kaaber. Whereas in Kaaber the potatoes are cut into 1.5 mm thick "slices" (see under Materials and Methods on page 40), in the claimed method the potatoes are chopped into batons having a larger cross-sectional area. This amendment alone is considered to put novelty beyond doubt as to be a proper anticipation rejection each of the claimed limitation must be found in the prior art.

As noted in Applicants' last response, the requirement in the claim that the

Appl. No. 10/528,734  
Response dated: September 30, 2010  
Reply to OA of: March 30, 2010

method is carried out with the specific *intention and result* of reducing acrylamide production on final cooking of the part-cooked product is also considered to distinguish over Kaaber. In this regard, Applicants note that in the passage bridging pages 7 and 8 of the Official Action, the Examiner himself acknowledges that this *is* a limiting feature of the claim. Kaaber discloses the fermentation of thinly sliced potatoes with *Lactobacillus* strain NCIMB 40450 *solely* for the purpose of reducing browning upon deep-frying; there is no *specific* disclosure relating to acrylamide reduction.

The requirement in claims 22 and 23 that the method further involves the step of subsequently cooking the part-cooked potatoes further distinguishes over Kaaber. Since Kaaber is only concerned with the production of "chips" this involves only a one-step cooking process in which the potato slices are fried. There is no mention of par-frying or any two-step cooking process which is an essential feature of any method for the production of French fries.

In suggesting that the disclosure of Kaaber anticipates claim 13 the Official Action relies on "Health Canada", Grivas *et al.* and Afssa *et al.* as evidence that the method taught by Kaaber would *inherently* have achieved the claimed result of reduced acrylamide formation. However, this overlooks the important point which is that Kaaber fails to teach that the method is carried out with the specific intention of reducing acrylamide production. Whether or not carrying out the method taught by Kaaber would inherently have this effect is irrelevant in considering the novelty of the claims. These require that the method is carried out with the intended result of achieving a reduction in acrylamide and can thus only be anticipated by an earlier reference which specifically discloses the treatment of potato cuts for this purpose.

Absent any disclosure in Kaaber of the production of French fries, the reduction in acrylamide or a two-stage cooking method, the rejection under 35 U.S.C. 102 should be withdrawn.

The rejection of claim 14 as set forth in item 4 of the Official Action on page 5 has been obviated by the cancellation of this claim from the application.

The rejection of claims 16 and 17 under 35 U.S.C. 102 (b) as anticipated by El-Hag et al has been carefully considered but is most respectfully traversed in view of the amendments to the claims. To the extent this objection may be applicable to new claim 24, this should be withdrawn. This claim requires that the French fries could be produced by a method which involves fermentation with a lactic acid producing bacterium. This method inevitably confers certain characteristics on the resulting product, whether this is part-cooked or also subjected to a final cooking step. El-Hag *et al.* does not contain any disclosure relating to fermentation of the potato strips with a lactic acid producing bacterium, but instead discloses only water-blanching prior to frying. The different method used in the prior art would inevitably lead to a different product. Therefore, this novelty objection should also be withdrawn.

The rejection of claims 13-20 under 35 U.S.C. 103 as being obvious over Kaaber in view of El-Hag et al and Shanbhag, Health Canada and further in view of Grivas et al, Afssa and Soe has been carefully considered but is most respectfully traversed in view of the amendments to the claims and the following comments.

It is urged in the Official Action that Applicants were not the first to recognize that the reaction between an amino acid, such as asparagine, and reducing sugars, such as glucose, would result in the formation of acrylamide when thermally processing potatoes. It is then suggested that once these particular reactants were recognized in the acrylamide formation reaction, to reduce one of these reactants would have been obvious to one having ordinary skill in the art for the purpose of reducing the formation of acrylamide. However, these arguments are influenced by hindsight knowledge of the Applicant's invention. As will be discussed herein, at the priority date of the invention the mechanism for the formation of acrylamide was far from clear and there was no universally accepted reaction mechanism for acrylamide formation. Whilst the reaction between asparagine and glucose may have been one possible route to the formation of acrylamide, many others were under consideration. Knowledge of one of many possible reaction mechanisms would not necessarily lead to the expectation of the presently claimed invention.

Afssa ("Acrylamide: Information Point") is an opinion from the French Food Safety Agency on the significance of the results relating to the detection of acrylamide in certain foodstuffs (summary) and gives toxicological data as well as exposure assessment. French fries are mentioned under the heading "Glucides" on page 2 of 8 and several *hypotheses* concerning the formation of acrylamide are given on pages 3-4. These are 1) degradation of glucides at over 180°C; 2) Maillard reaction between amino acids or proteins and glucides; 3) degradation of amino acids and proteins; and 4) transformation of fats. Afssa questions the mechanisms and kinetics of acrylamide formation as well as the conditions for the formation of acrylamide during cooking processes and whether exposure is entirely a result of free acrylamide in foods or if there is another source of exposure resulting from acrylamide bound proteins in the food matrix (see under "Further Examination" at page 8). The Examiner's selection of the Maillard reaction from this document relies on hindsight knowledge of the invention. Those skilled in the art reading this opinion would readily appreciate its speculative nature and the possibility that other reaction mechanisms not involving amino acids and glucides were equally plausible. There would thus be no incentive to focus on the Maillard reaction.

With regard to Grivas *et al.*, the Official Action overlooks the conclusion of this report, namely "that the exact chemical mechanism(s) for acrylamide formation in heated foods is *not known*" (emphasis added - see page 3, lines 6-7 and page 18 under "Conclusions"). Notably, Grivas *et al.* concludes at page 3, paragraph 3:

"The current data on acrylamide levels in various foods is still very limited and makes a weak basis for conclusions on mechanisms for acrylamide formation. There are indications in support of that the Maillard reaction *might* be an important reaction route for the acrylamide formation, *but also lipid degradation pathways to the formation of acrolein should be considered.*" (emphasis added).

On page 7, Grivas *et al.* puts forward various hypotheses for the formation of

acrylamide during food processing. Those involving the formation of acrolein (under A) are similar to those mentioned in Afssa as discussed above. However, only one of these concerns the Maillard reaction (proposal 4). Other mechanisms involve 1. transformation of lipids; 2. degradation of amino acids and proteins; and 3. degradation of carbohydrates. Not only this, but there are other alternative mechanisms of acrylamide formation which are put forward and which do not necessarily involve acrolein (see under B on page 7). The conclusion to this section of the document on page 8 is relevant. This reads as follows:

"Since no systematic studies have been performed or reported, there is at present *no evidence to point out any specific reaction routes for acrylamide formation*, or to exclude any possibilities. Most probably a *multitude of reaction mechanisms is involved, depending on food composition and processing conditions.*" (emphasis added).

In relation to the Maillard reaction, the disclosure at page 11 is also relevant. This lists various factors which are considered to be important for the Maillard reaction, including the type of sugar and amino acid (protein), time, temperature and water activity. Presence of metal salts (pro-oxidants), and inhibitors, like antioxidants and sulphide, are also suggested to have an impact on the Maillard reaction. Given the number of factors involved, it cannot be concluded that any particular measure would be an obvious choice in addressing acrylamide formation. This is highlighted on page 13 under the heading "Inhibition of the Maillard reaction" where various measures to inhibit the Maillard reaction are proposed. These include lowering of the pH value, maintenance of lowest possible temperatures and avoidance of critical water contents (moistures below 30%, during process and storage), use of non-reducing sugars, addition of sulphite and use of the inhibitor sulphur dioxide. Notably, none of these involves a method which specifically aims to reduce the amount of reducing sugars in a product, such as potato, where these may be present in high amounts. Grivas *et al.* goes on, at page 14, to suggest that

Appl. No. 10/528,734  
Response dated: September 30, 2010  
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of the two starting materials in the Maillard reaction, the concentration of reducing sugar has the greatest impact on colour development. Therefore, this document only teaches the skilled person to lower the amount of reducing sugar in order to limit colour production, not to reduce acrylamide production.

Finally, "Health Canada" discloses only a *possible* route for the formation of acrylamide in baked or fried foods such as potatoes. It clearly suggests that not much is known about other possible pathways of formation of acrylamide in foods and that "research is still ongoing".

Thus, at the priority date of the invention a number of mechanisms were generally under discussion with respect to the formation of acrylamide. The Examiner's specific reliance on the Maillard reaction is considered to be based on hindsight. Moreover, even if those skilled in the art were to consider this important in the formation of acrylamide, it does not necessarily follow that it would be obvious to reduce the amount of reducing sugar as the Examiner suggests.

In order to arrive at the claimed invention the skilled person has to make a number of choices from within the teaching of the prior art. Not only must he choose which food product to treat, but must decide which mechanism of acrylamide formation he wishes to inhibit. As previously noted, the Maillard reaction is just one of a number of possibilities for the production of acrylamide. Even if he chooses to address this reaction, he must then decide how to inhibit this. Contrary to the Examiner's suggestion, this is not as straightforward as simply removing one of the reactants. As noted above in relation to Grivas *et al.*, this mentions various different measures to inhibit the Maillard reaction. Moreover, none of the cited prior art teaches which of the two reactants may be the limiting reagent in the reaction to form acrylamide. Finally, even assuming the skilled person chose to reduce the level of reducing sugars, he then has to choose a way of dealing with this. Treatment methods other than treatment with lactic acid producing bacteria could be used. Once again, it is only with hindsight knowledge of the invention that the Examiner is able to rely on Kaaber for this feature of the invention.

It is the Applicant's position that none of the prior art documents, alone or in

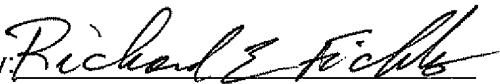
Appl. No. 10/528,734  
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combination, provide a clear teaching, suggestion or motivation to reduce the level of reducing sugars using a lactic acid producing bacterium in order to reduce acrylamide formation in the production of French fried potatoes. For these reasons, the unobviousness of the claimed subject matter should be acknowledged and the claimed subject matter allowed.

Finally, it is noted that the inventors have found that when French fry potato cuts are fermented with a lactic acid producing bacterium the reduction in acrylamide levels are unexpectedly high. Specifically, they have found that fermentation of potato rods with *Lactobacillus plantarum* prior to deep-frying leads to a substantial reduction in the final acrylamide content of the French fry product of up to 94%. Such results clearly support the patentability which may be something which could be discussed with the Examiner at an interview at which Applicants could put forward some results in the form of a declaration by one of the inventors in due course. Accordingly, it is most respectfully requested that this rejection be withdrawn.

In view of the present amendment and the foregoing remarks, therefore, Applicants believe that the present application is in condition for allowance at the time of the next Official Action. Allowance and passage to issue on that basis is respectfully requested.

Respectfully submitted,  
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